

application to Ballard Power Systems Inc., which is my current employer.

2. It is my understanding that the Patent Examiner has rejected our claims as being obvious and has asserted that it would have been obvious to provide a fuel cell stack with anodes comprising a supported catalyst where the loading of the catalyst on the support was greater than 40% by weight. I understand that the relevant time for determining obviousness is before we filed our provisional patent application on December 16, 1999.

3. At that time, it was not recognized that it was desirable for anodes having a supported catalyst in a fuel cell stack to be made more resistant to oxidative corrosion for purposes of tolerance to voltage reversal.

4. At that time, persons working in this field would not have used loadings of catalyst on the support in amounts greater than 40% by weight. They would have been discouraged from doing so by the following factors.

5. First, it was recognized that anodes having increased loading above a certain level had decreased specific catalyst

activity. Although the surface of the support would be covered with more catalyst if the loading was increased, the specific activity of the catalyst would not be as high (as measured as activity/gram) as it would be at lower loadings. In a comparison of platinum loading of an electrode to the specific catalyst activity of the electrode, the specific catalyst activity increased with increasing platinum loading up to 20%. The specific catalyst activity then decreased as the platinum loading is increased above 20%. That is, the optimal platinum loading for specific catalyst activity occurs at around 20% Platinum loading.

6. At the time before December 16, 1999, it was known that the effective metal catalyst surface area decreased with increasing loading, thereby resulting in a decrease in specific catalyst activity. Accordingly, anodes with catalyst loadings above 40% by weight would have been recognized at that time as having lower specific catalyst activity than smaller loadings. This would have discouraged the use of catalyst loadings greater than 40% by weight. The references cited by the Examiner support this statement, in that they teach away from the use of catalyst loadings greater than 40%. For example, in Giallombardo International Publication No. WO 99/53557, the examples employ a catalyst loaded on a carbon support at approximately 30% by

weight. As another example, Ramunni European Patent No. 872,906, paragraph 0023, recites an optimum catalyst loading of 30-40%.

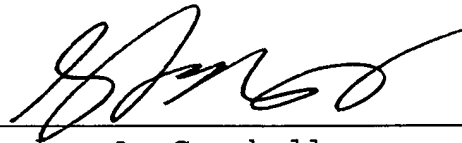
7. Second, persons working in this field at that time would have wanted to minimize the amount of catalyst on each anode in order to minimize costs. With decreased specific catalyst activity comes increased cost, especially when the catalyst is a precious metal such as platinum. Therefore, decreased specific catalyst activity results in increased fuel cell costs. This also would have discouraged the use of catalyst loadings greater than 40% by weight.

8. Before our invention, I did not believe there were any benefits to loading an anode catalyst above 40% by weight in a fuel cell stack.

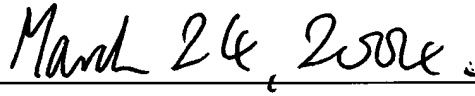
9. I do not believe that, before our invention, there were any known benefits to loading an anode catalyst above 40% by weight in a fuel cell stack that would have outweighed the known drawbacks (as described above) which discouraged doing so.

I hereby declare that all statements made herein of our own knowledge are true and that all statements made on information

and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.



Stephen A. Campbell



Date